

DIVE SAFETY AND WORK PLAN
RM11E Sediment Sampling, Willamette River
for
GSI Water Solutions

EMERGENCY RESPONSE INFORMATION

NOTE: Call local 911 first in case of any medical emergency prior to traveling to the emergency medical facility. Call DAN with questions regarding treatment of diving emergencies.

Telephone emergency: 911 and DAN 1-919-684-8111

Coast Guard emergency: 503-240-9311 USCG Portland

Dive Emergency Gear: First aid kit, emergency oxygen kit, backboard/litter, VHF radio, and cellular phone

Nearest Dive Emergency Medical Facilities:

Providence Portland Medical Center, 4805 NE Glisan St., (503) 215-6061 hyperbaric
(503) 215-1111 after hours

Nearest Non-dive Emergency Medical Facilities:

Legacy Good Samaritan Hospital, 1015 NW 22nd Ave., (503) 413-7711 switchboard 24hrs

DIVE PLAN

Project: RM11E Sediment Characterization

Daily Work window: Start 0900, end 1700

Field Managers: Eric Parker, RSS: (206) 550-5202; Erin Carroll Hughes, GSI: (503) 927-4553

Dates of operation: October 21-25, 2013

Location of Dives: Nearshore, east side, between the Broadway and Freemont Bridges

EMS Rendezvous: Multnomah Co. Sheriff Dock, 2253 Front Street

Dive Supervisor: Eric Parker

Primary Diver: R.J. Myers

Standby Diver: Eric Parker

Tender: Brian Bonifaci

Purpose of Work: Collect surface sediment samples

Number of Dives Anticipated: 7

Maximum Depth Anticipated: 30fsw

Maximum Bottom Time Anticipated: 10 minutes/dive

Depth for Majority of Work: 25fsw and shallower

Average Visibility on Site: 1-5ft expected

Diving Mode: SCUBA

Breathing Gas: Air

Backup Air Supply: 19ft³ bailout tank to manifold block; second stage regulator from primary and bailout

Communications: Hardwire to full-face mask



Directions to 4805 NE Glisan St, Portland, OR 97213

7.0 mi – about 13 mins

Providence Portland Medical Center, 4805 NE Glisan St.

(503) 215-6061 hyperbaric

(503) 215-1111 afterhours

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Ross Island

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Directions to Legacy Good Samaritan Medical Center

1015 NW 22nd Ave, Portland, OR 97210

1.1 mi – about **5 mins**

Legacy Good Samaritan Hospital, 1015 NW 22nd Ave
(503) 413-7711 switchboard 24hrs

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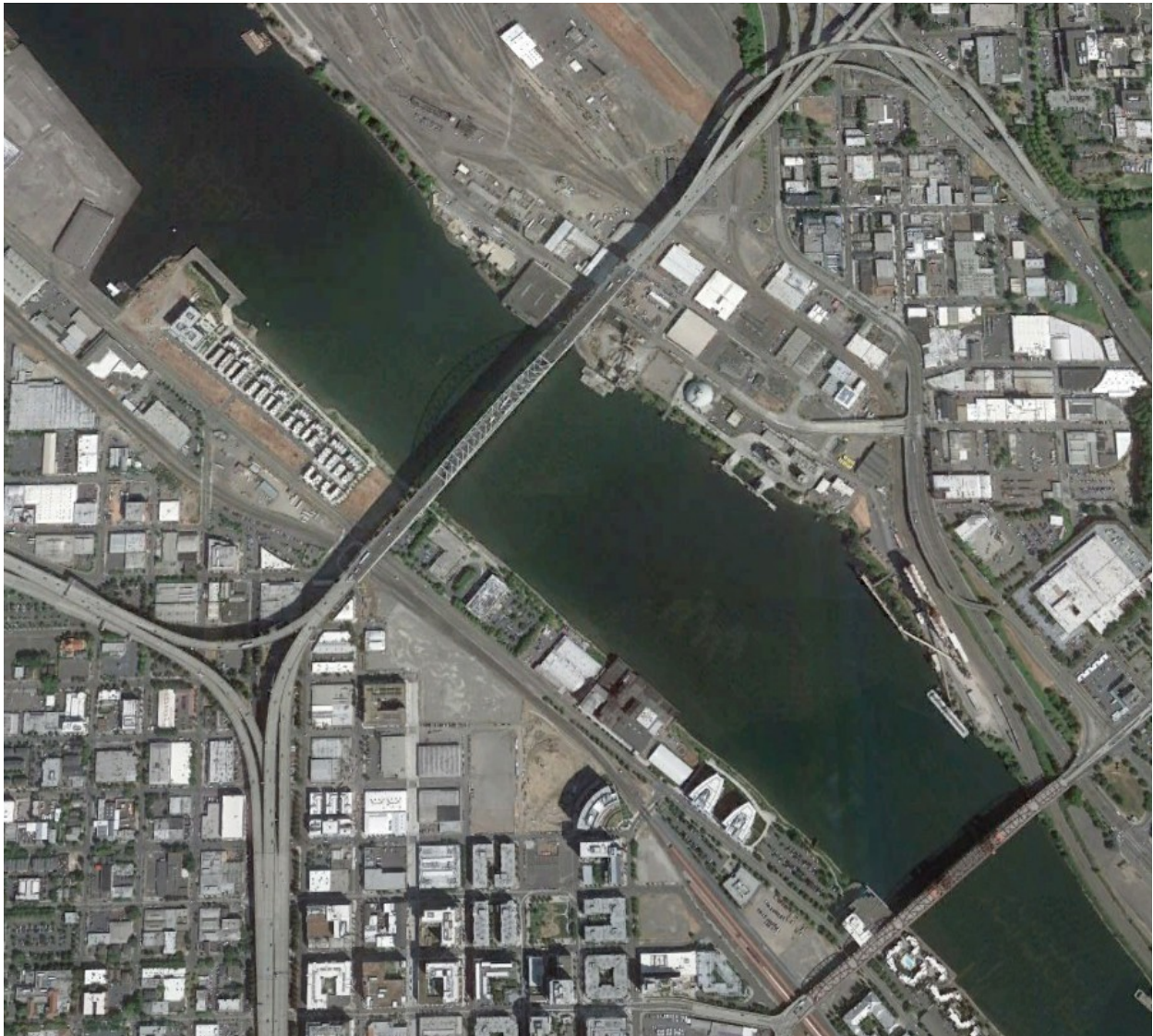
PRE-DIVE SAFETY PROCEDURES

- A pre-dive briefing will be conducted to familiarize divers and surface personnel of site-specific hazards and to ensure readiness to work.
- All equipment will be checked on deck to ensure it is in proper working order.

GENERAL WORK PLAN

- Operations will be conducted from the *Carolyn Dow*, a 36' aluminum landingcraft anchored adjacent to the dive location, with 3 dive operations personnel and two representatives from GSI on board.
- A single, line-tended diver will conduct the sampling using a hand-operated sampler.
- A safety diver will stand by on the vessel ready to assist.
- Divers, tender and dive supervisor will communicate via a round-robin hardwire communication system with 12v supply and battery backup.

AREA OF OPERATIONS



SAFETY PROCEDURES

- Diving operations will be conducted in accordance with federal and state health and safety regulations. The RSS Dive Safety Manual (attached) is crafted to address equipment, training and procedures relevant to the sampling and instrument installation conducted by RSS divers. The GSI Site Specific Health and Safety Plan will apply to non-diving components of this operation and will be reviewed and signed by all participants.
- A dive log will be maintained during the day showing depth, bottom time, surface interval and repetitive group designation. Divers may use computers to track no-decompression limits.
- In the event of a dive computer failure, allowable bottom time shall be calculated using tables. No-decompression limits will be calculated using NDL and RNT tables from the US Navy Diving Manual, version 6.
- A blue-and-white alpha flag and the red-and-white recreational dive flag will be flown at above the working surface during dive operations.
- Emergency oxygen will be available on site in case of a pressure-related injury. In addition to administration of oxygen to an injured diver, basic first aid and activation of EMS will apply.
- All divers will carry a 19ft³ auxiliary bailout bottle should a malfunction occur with the primary air supply.
- Divers will wear a safety harness capable of lifting them aboard the vessel; however, the preferred method of bringing an injured diver aboard is via the lowered bow door. A rescue stretcher (litter) will be on site during dive operations and used for transport if necessary.

EMERGENCY MANAGEMENT

First aid supplies shall be provided and kept readily accessible at the work site. In addition, an American Red Cross standard first aid handbook or equivalent, and medical oxygen shall be available at the dive location.

The primary means of activating emergency services shall be through cellular telephone. A list of primary emergency contact numbers is provided on page 1 of this plan.

In the event of the need for emergency transport, 911 operators will coordinate EMS response.

The following table provides a list of potential emergency situations that may arise and suggested actions to be taken in the event of an occurrence:

| EMERGENCY SITUATION | RECOMMENDED ACTION |
|----------------------------|---|
| Entrapped or fouled diver | Provide diver a reasonable amount of time to clear the entanglement. The second diver will enter the water to assist if necessary. Once the diver is free, if anxious or second diver was required to go to his assistance, terminate dive. The dive supervisor will determine if further dives will be performed that day. |

| EMERGENCY SITUATION | RECOMMENDED ACTION |
|--------------------------|---|
| Loss of breathing medium | <p>Check fill of each cylinder for primary air supply prior to dive operations.</p> <p>Check fill of emergency air supply prior to dive operations.</p> <p>Switch to emergency air supply and surface at a safe ascent rate.</p> <p>Standby diver shall assist the divers as required.</p> <p>If two divers are in the water and the out-of-air diver is not receiving gas from the emergency air supply, that diver shall go to the secondary regulator (octopus) of the second diver and both divers shall surface immediately.</p> |
| Loss of communication | <p>Plan the dive and position the boat so communications can be maintained between diver and the boat/tender.</p> <p>If communications cannot be maintained, resort to pull signals and terminate dive.</p> <p>The dive supervisor will determine if pull signals are sufficient for the work at hand and the conditions, and whether further dives will be performed that day.</p> <p>Two divers may work as a team without voice communication if they are connected via a short "buddy line"</p> |
| Lost diver | <p>Avoid panic. Second diver shall review recent movements to ascertain general vicinity of lost diver. Look for bubbles to verify position of lost diver.</p> <p>Upon loss of visual contact, buddy divers shall surface within two minutes and reestablish contact.</p> |
| Injured diver | <p>Divers immediately surface and inform topside of the nature and extent of injury.</p> <p>Proper decompression schedules should be followed except when the severity of the injury indicates a greater risk than omitting decompression.</p> <p>The second diver shall monitor the injured diver's breathing during ascent.</p> <p>Request medical assistance and emergency evacuation as required.</p> |

| EMERGENCY SITUATION | RECOMMENDED ACTION |
|--|---|
| <p>Dry suit or BCD blow-up/rapid ascent to the surface</p> <p>OR</p> <p>Obvious signs of pressure-related injury</p> | <p>Evaluate diver for symptoms of decompression sickness, air embolism and lung-overexpansion injury.</p> <p>If no symptoms are present, advise diver to be aware that symptoms may occur up to 24 to 48 hours later and to seek medical help if they do.</p> <p>If symptoms are present, administer medical oxygen, notify emergency services, and arrange for transport to the nearest recompression chamber.</p> |
| <p>Injury/illness of member of surface crew with diver in the water</p> | <p>Notify divers of the injury/illness.</p> <p>Abort dive.</p> <p>Request medical assistance and emergency evacuation as required.</p> |
| <p>Diver loss of consciousness</p> | <p>Second diver shall bring the unconscious diver to the surface at a safe ascent rate.</p> <p>Standby diver shall stand ready to assist the divers as required.</p> <p>Contact emergency services.</p> <p>Administer First Aid/Rescue Breaths/CPR as appropriate and transport the diver to the nearest medical facility.</p> |

ACTIVITY HAZARD ANALYSIS

| Job Steps | Hazards | Controls |
|--|---|--|
| Transporting personnel and boat safety | Vehicle collision | Seat belts shall be worn at all times by driver and passengers, no cell phone use by driver |
| | Drowning | All personnel shall wear personal flotation devices when in boats or over water unless they are in a zipped drysuit |
| | Slips, trips and falls | An orientation to the vessel will point out potential hazards such as slippery surfaces and protruding objects |
| | Windlass injury | All personnel shall be instructed in windlass safety, and will remain clear when in operation |
| | A-frame and hydraulics | Pinch points will be pointed out, and hardhats will be required when a-frame is in motion or suspended loads are present. |
| | Access/egress to the dive platform | Divers will enter and exit the water via the side-mounted dive ladder to avoid the potential for jumping into shallow water or onto an obstruction. Divers will remove their fins and hang them from their wrists when coming aboard |
| Use of HP cylinders | Vessel anchoring | The vessel will be anchored fore and aft adjacent to the dive location. If the vessel must be moved when divers are in the water, windlasses, not the boats motors, will be used. |
| | Catastrophic failure of HP cylinders | All cylinders shall be in good condition with current VIP and hydro inspections, cylinders shall be securely positioned in boat |
| | Cylinder valve failure | All cylinders and valves shall be in good condition with current VIP and hydro inspections on the cylinders |
| Underwater activities | Freezing of valves or regulators on HP cylinders | Monitor valves and regulators during low temperatures for signs of icing |
| | Loss of air to diver | Diver experiencing loss of air shall switch to the emergency air supply, signal the second diver if present, and surface together. |
| | Loss of ability for voice communications when divers on the surface | The boat shall be positioned as close as possible to area being inspected and moved as necessary, without power |
| | Hypothermia | Divers to be dressed appropriately for the conditions |
| | Decompression sickness | All dives shall follow diver's computer or US Navy decompression tables. Any signs of decompression sickness will be treated with oxygen administration, basic first aid and activation of EMS. |

| | | |
|-----------------------|---|--|
| Underwater activities | Vessel traffic | Dive flag shall be posted at dive site prior to divers entering the water. Approaching vessels shall be contacted by VHF and flagged by the topside crew. |
| | Adverse sea-state | Diving supervisor shall determine if it is possible for a diver to safely enter and exit the water routinely and in an emergency. |
| | Poor visibility | Dive lights and mandatory communications will be used during low vis. situations. Diving supervisor shall determine if operations shall cease due to visibility. |
| | Diver entanglement or trapped diver | Review dive plan before dive noting conceivable obstructions/entanglements to the divers. The boat shall be positioned as close as possible to area being inspected and moved as necessary, without power, while the divers are in the water. Diver experiencing loss of air shall switch to the emergency air supply, signal the second diver if present, and surface together. |
| | Loss of air to diver | |
| | Loss of ability for voice communications when divers on the surface | The boat shall be positioned as close as possible to area being inspected and moved as necessary, without power |
| | Hypothermia | Divers to be dressed appropriately for the conditions |
| | Decompression sickness | All dives shall follow diver's computer or US Navy decompression tables. Any signs of decompression sickness will be treated according to Safety Plan. |
| | Vessel traffic | Dive flag shall be posted at dive site prior to divers entering the water. Approaching vessels shall be contacted by VHF and flagged by the topside crew. |
| | Adverse sea-state | Diving supervisor shall determine if it is possible for a diver to safely enter and exit the water routinely and in an emergency. |
| | Poor visibility | Dive lights and mandatory communications will be used during low vis. situations. Diving supervisor shall determine if operations shall cease due to visibility. |
| | Diver entanglement or trapped diver | Review dive plan before dive, noting conceivable obstructions/entanglements to the divers. The boat shall be positioned as close as possible to area being inspected and moved as necessary, without power, while the divers are in the water. |

EQUIPMENT CONSIDERATIONS

| Equipment to be Used | Training Requirements | Inspection Requirements |
|---|---|--|
| High pressure air cylinders including 30 ft ³ bailout bottle | Handling of cylinders | Visual inspection, current VIP and hydrostatic test |
| Dive system including hoses, manifolds and regulators, BCD, submersible pressure gauge, quick release weight system, depth gauge, knife, dive timer for diver and dive supervisor | Experienced and familiar with component function and operating procedures | Annual service. Visual inspection, pre-operations test to ensure proper operation |
| Dry suit | Experienced and familiar with dry suit operations | Check proper inflation/deflation prior to diving. Inspect valves to ensure proper operation. |
| Full-face mask and hardwire communications | Experienced and familiar with component function and operating procedures | Annual service. Visual inspection and pre-operations safety check |
| Tending line and positive-buckling safety harness | Experienced and familiar with component function and operating procedures | Visual inspection and pre-operations safety check |

RSS OSHA Compliance

Research Support Services is committed to performing services in accordance with the standard of care of our profession including maintaining safe work conditions during operations and at minimum will employ procedures and guidelines as dictated by OSHA 29 CFR Part 1910, Subpart T – Commercial Diving, dated 6/13/2011.

RSS EM385 30.A.17 Compliance

If for any reason the dive plan is altered in mission, depth, personnel, or equipment, the EPA DDC will be contacted in order to review and accept the alteration prior to actual operation.

DIVE LOG

RESEARCH SUPPORT SERVICES

Project _____

Page _____ of _____

Client _____

Client Project No. _____

Personnel _____

[illegible]

US Navy No-Decompression Dive Tables

Table 9-7. No-Decompression Limits and Repetitive Group Designators for No-Decompression Air Dives.

| Depth (fsw) | No-Stop Limit | Repetitive Group Designation | | | | | | | | | | | | | | | |
|----------------|------------------|------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | Z |
| 10 | Unlimited | 57 | 101 | 158 | 245 | 426 | * | | | | | | | | | | |
| 15 | Unlimited | 36 | 60 | 88 | 121 | 163 | 217 | 297 | 449 | * | | | | | | | |
| 20 | Unlimited | 26 | 43 | 61 | 82 | 106 | 133 | 165 | 205 | 256 | 330 | 461 | * | | | | |
| 25 | 595 | 20 | 33 | 47 | 62 | 78 | 97 | 117 | 140 | 166 | 198 | 236 | 285 | 354 | 469 | 595 | |
| 30 | 371 | 17 | 27 | 38 | 50 | 62 | 76 | 91 | 107 | 125 | 145 | 167 | 193 | 223 | 260 | 307 | 371 |
| 35 | 232 | 14 | 23 | 32 | 42 | 52 | 63 | 74 | 87 | 100 | 115 | 131 | 148 | 168 | 190 | 215 | 232 |
| 40 | 163 | 12 | 20 | 27 | 36 | 44 | 53 | 63 | 73 | 84 | 95 | 108 | 121 | 135 | 151 | 163 | |
| 45 | 125 | 11 | 17 | 24 | 31 | 39 | 46 | 55 | 63 | 72 | 82 | 92 | 102 | 114 | 125 | | |
| 50 | 92 | 9 | 15 | 21 | 28 | 34 | 41 | 48 | 56 | 63 | 71 | 80 | 89 | 92 | | | |
| 55 | 74 | 8 | 14 | 19 | 25 | 31 | 37 | 43 | 50 | 56 | 63 | 71 | 74 | | | | |
| 60 | 60 | 7 | 12 | 17 | 22 | 28 | 33 | 39 | 45 | 51 | 57 | 60 | | | | | |
| 70 | 48 | 6 | 10 | 14 | 19 | 23 | 28 | 32 | 37 | 42 | 47 | 48 | | | | | |
| 80 | 39 | 5 | 9 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 39 | | | | | | |
| 90 | 30 | 4 | 7 | 11 | 14 | 17 | 21 | 24 | 28 | 30 | | | | | | | |
| 100 | 25 | 4 | 6 | 9 | 12 | 15 | 18 | 21 | 25 | | | | | | | | |
| 110 | 20 | 3 | 6 | 8 | 11 | 14 | 16 | 19 | 20 | | | | | | | | |
| 120 | 15 | 3 | 5 | 7 | 10 | 12 | 15 | | | | | | | | | | |
| 130 | 10 | 2 | 4 | 6 | 9 | 10 | | | | | | | | | | | |
| 140 | 10 | 2 | 4 | 6 | 8 | 10 | | | | | | | | | | | |
| 150 | 5 | 2 | 3 | 5 | | | | | | | | | | | | | |
| 160 | 5 | | 3 | 5 | | | | | | | | | | | | | |
| 170 | 5 | | | 4 | 5 | | | | | | | | | | | | |
| 180 | 5 | | | 4 | 5 | | | | | | | | | | | | |
| 190 | 5 | | | 3 | 5 | | | | | | | | | | | | |

* Highest repetitive group that can be achieved at this depth regardless of bottom time.

Read vertically downward to the 30 fsw repetitive dive depth. Use the corresponding residual nitrogen times to compute the equivalent single dive time. Decompress using the 30 fsw air decompression table.